

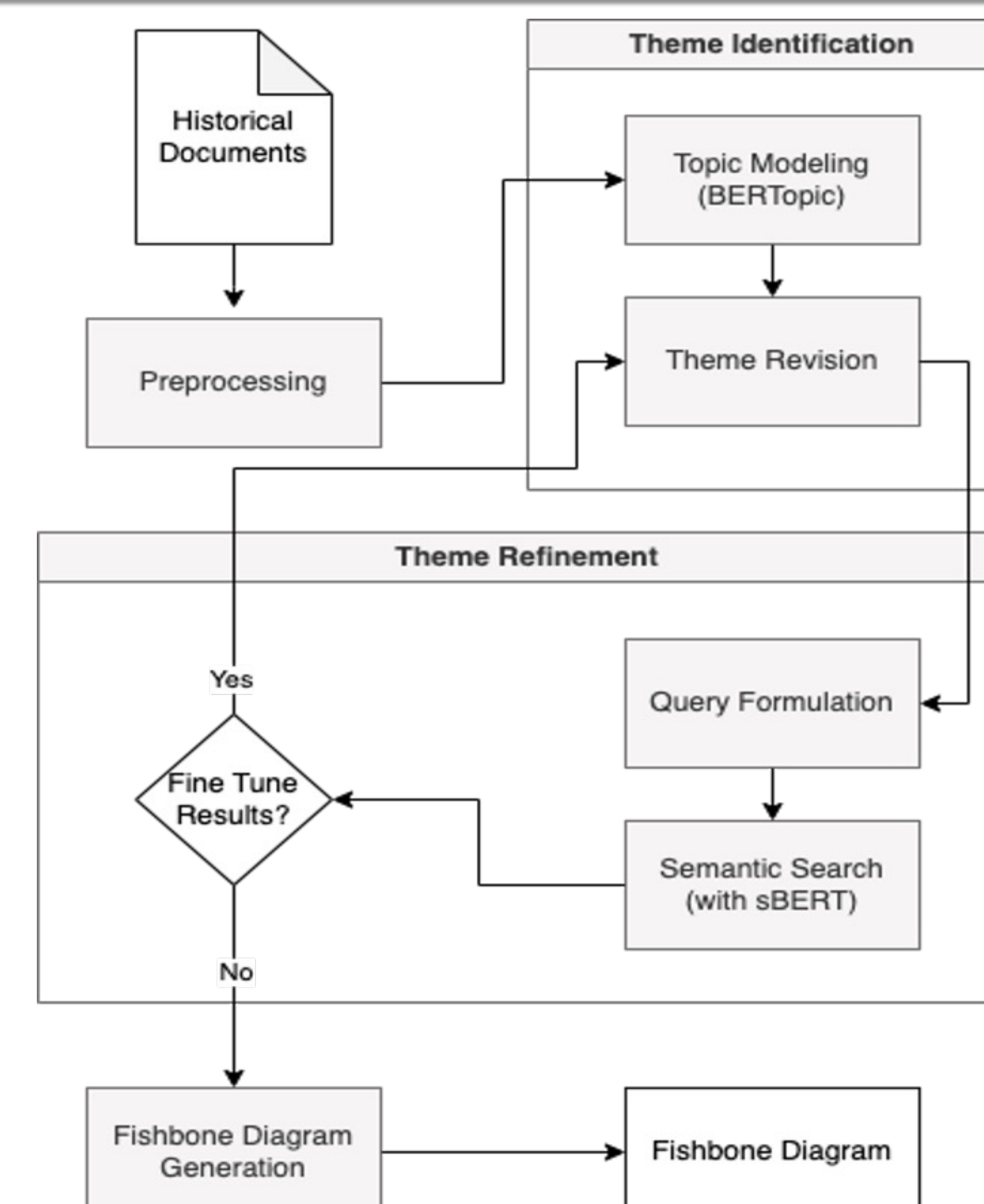
BERT-based Topic Modeling and Information Retrieval to Support Fishbone Diagramming for Safe Integration on Unmanned Aircraft Systems in Wildfire Response

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Problem Definition – Objectives

- ❖ Increasing wildfire incidents in the US pose significant risks to wildland firefighters.
- ❖ Uncrewed Aircraft Systems (UAS) are proposed for broader integration in wildfire management to reduce human risks and perform various tasks
- ❖ Challenges in integrating UAS safely include unstructured data formats in incident repositories
- ❖ Leveraging Natural Language Processing can help efficiently extract information relevant to operations
- ❖ We propose applying BERT-based techniques to develop a fishbone diagram showing hazards pertaining to use of UAS in wildfire response missions

Approach



Use Case



Discussions

- ❖ Calls to identify novel, safer ways, such as UAS, to manage wildfire incidents continue to grow
- ❖ UAS integration must be done safely by leveraging historical documents
- ❖ Relevant data can be extracted from various sources, such as news articles and incident reports
- ❖ Information extracted using NLP can be integrated with systems engineering principles to enable the design and deployment of UAS operations with a risk management approach

Conclusions and Future Work

- ❖ We proposed a process to generate a fishbone diagram using topic modeling and semantic search
- ❖ The process was applied to a use-case of a UAS in a wildfire response operation
- ❖ A fishbone diagram showing the chronological order of events possibly leading up to a UAS incident was generated
- ❖ In future work, the proposed process will be studied within a more realistic, robust scenario to validate results.

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Results: Fishbone Diagram

